

AIRS Outreach

Science Team Meeting May 2009

Sharon Ray, JPL



News Releases, Image Releases, & Stories

- Oreste Reale's paper "AIRS impact on the analysis and forecast track of tropical cyclone Nargis in a global data assimilation and forecasting system" is the basis for a news release and JPL climate portal story.

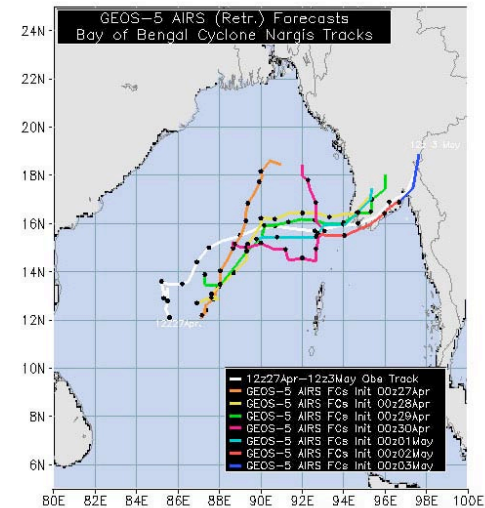
Research shows the cyclone's landfall position could have been much better predicted -- with an uncertainty six times smaller -- had more sophisticated atmospheric temperature data been included.

- GSFC news release is called "NASA Experiment Stirs Up Hope for Forecasting Deadliest Cyclones"
- JPL Climate Portal story is called "Breaking Through the Clouds"

News release carried on NASA, JPL, Earth Observatory, in addition carried by UPI, EurekAlert (Wash R&D Daily, Digg.com, SpaceRef, SpaceDaily, ScienceDaily, China Meteorological Assn.

- Carbon Monoxide from the Australian Fires of Feb 2009 as seen by AIRS – JPL Home Page Headline

Movie created by Ed Olsen highlights global CO transport from the Australian Fires covers the entire event (February 1 through February 17.) Movie was a JPL Home Page headline and was placed on the JPL Photojournal.



SPACE DAILY
 your portal to space

R&D **NEWSTIM**

Modeling breakthrough picks up trail of deadly cyclones

UPI.com
 100 YEARS OF JOURNALISTIC EXCELLENCE

SpaceRef.com

SOFTPEDIA™
 Updated one minute ago


CMA
 China Meteorological Administration

SIMPLY GREEN
 CHOICES FOR LIFE

ScienceDaily
 Your source for the latest research news

Notable Image/Data Uses

- TAKE AIM climate change video

Music video called "Take AIM at Climate Change" produced by NASA, NSF, and Passport 2 Knowledge uses a rap artist and other singers to convey climate change facts. AIRS global CO₂ visualization is featured.

- CA Dept of Water use AIRS Imagery in Climate Change Educational Video

AIRS CO₂ increase with Mauna Loa data overlay featured in this information video that features scientist interviews and imagery

- Discovery Earth Live uses AIRS water vapor visualization

Imagery provided by Vince Realmuto

- NASA Hurricane Portal

*AIRS continues to be a major supplier of imagery. As of today, the **2009 archive contains 24 images, and 20 of them are from AIRS***



passporttoknowledge.com/polar-palooza/whatyoucando/taacc/

www.water.ca.gov/climatechange/

Public Outreach & Conference Support

- LA's Best

Outreach Coordinator Sharon Ray and Operations Engineer Tom Nolan partnered in giving presentations to two 4th grade after-school classrooms at Broadous Elementary in Pacoima as part of LA's Best, an afterschool program that serves underrepresented children in Los Angeles county.

- Eric Fetzer gives climate talk to the NASA Museum Alliance

AIRS scientist Eric Fetzer gave a presentation to members of the NASA Museum Alliance titled "How Human Activities Affect Climate". Museum Alliance members dial-in from around the country to listen to the presentation, and they download presentation slides from the Museum Alliance web site.

- American Meteorological Society Annual Conference

Sharon Ray worked in the NASA Booth on behalf of AIRS during the AMS spring meeting

- Outreach materials to students at White Oak Elementary in Westlake Village

Materials provided to first-grade Earth science students at White Oak Elementary in Westlake Village.





National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology

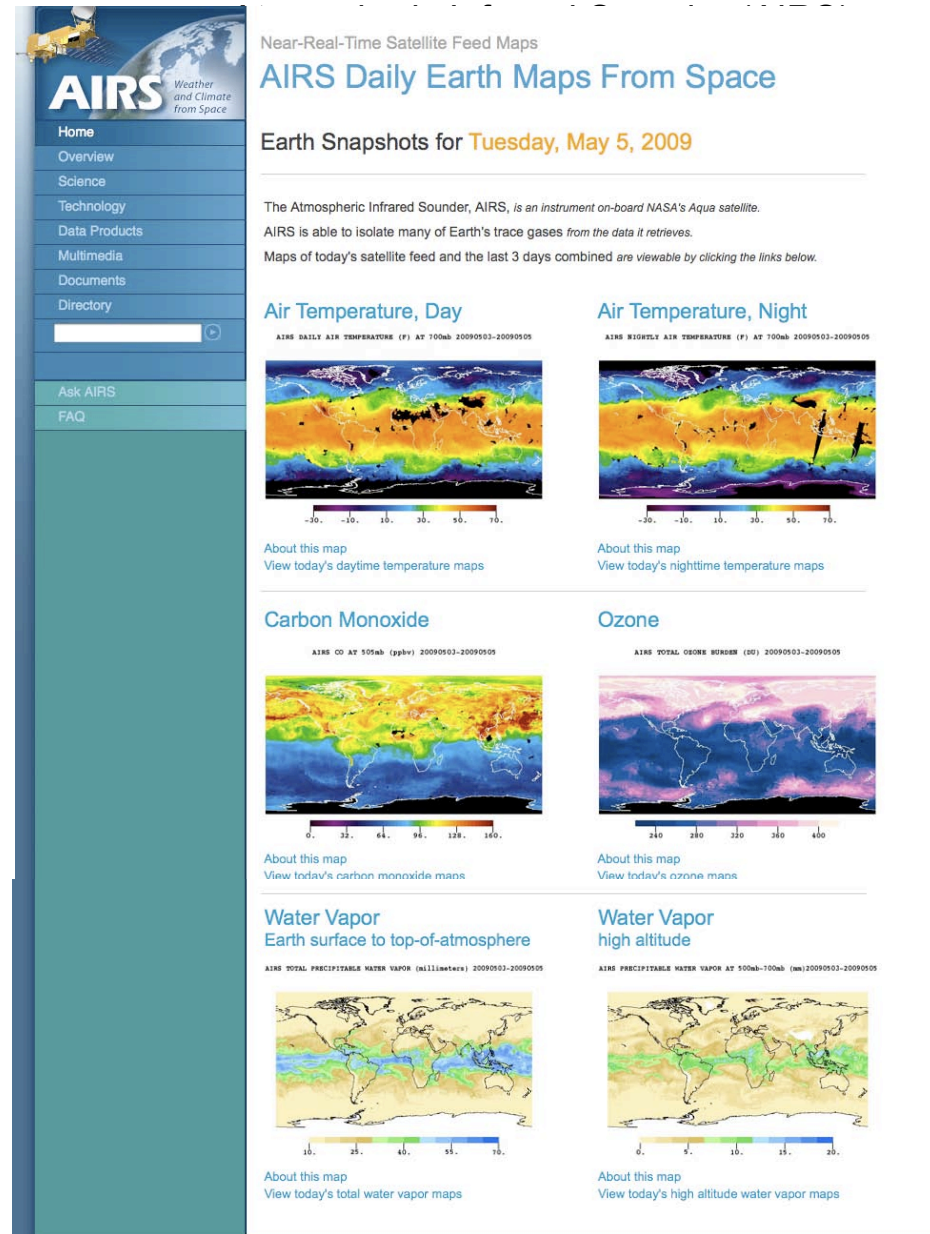
Web Site Enhancements

- Satellite Feed Maps

*Revised to be geared toward students. More information.
Home page will be revised to make this more prominent.*

Index Page features:

- summary information
- today's date
- 6 data products, NRT
- link to "About This Map" page for more detail
- link to side by side view



Atmospheric Infrared Sounder (AIRS) AIRS Web Site at airs.jpl.nasa.gov

“About This Map” Page features:

- summary information with links to “How These Maps Are Made” and “Chart of Earth’s Atmospheric Layers”
- satellite feed map
- information about the map and its colors
- link to orbit animation
- link to 3-day average map & Today’s Granule Maps

AIRS Daily Earth Maps from Space

AIRS Daily Earth Maps From Space

Data Granule Maps for

The AIRS instrument sweeps along its orbit gathering data. The data is then sectioned into pieces, and each piece is called a “granule”. Each AIRS data granule is roughly 2250 x 1650 km, or 1400 x 1025 miles.

The Aqua satellite on which AIRS flies makes two passes per day over the globe. On one pass the satellite is moving south to north (ascending), and on the other it is moving north to south (descending). The four granule maps below are updated two times each day. AIRS data users use maps like these to request their data from the data servers.

Granule Map of Ascending Swaths



North Polar Granule Map



Granule Map of Descending Swaths



South Polar Granule Map



AIRS Daily Earth Maps from Space

Daytime Air Temperature

Earth Snapshots for **Tuesday, May 5, 2009**

AIRS DAILY AIR TEMPERATURE (F) AT 700mb 20090505



AIRS, the Atmospheric Infrared Sounder, is an instrument on an Earth-orbiting NASA satellite called Aqua.

This map shows today's daytime air temperatures at 10,000 ft (3,000 m) altitude, as of the most recent download from the AIRS instrument.

Click map for a larger view

How are these maps made?
Chart of Earth's atmospheric layers

Today's near-real-time satellite feed map

Temperature in degrees Fahrenheit at 700 millibar atmospheric pressure
(10,000 ft / 3,000 m / 1.6 miles altitude)

What are the stripes in the satellite feed map?

The AIRS instrument on the Aqua satellite orbits Earth from pole to pole. Imagine if you held a beach ball and tried wrapping a ribbon around the ball, going from top to bottom then bottom to top. Depending on the width of the ribbon, it can take many loops to cover the entire ball. The stripes in the map show where AIRS collected data in its orbital path. We call this stripe a “swath”.

View orbit animation

Why are some data missing?

The map above is created from today's data only. AIRS orbits Earth 15 times a day - not enough orbits for AIRS to completely cover Earth. The space between the swaths show where AIRS has not yet retrieved data. We call these areas “gaps”. In addition this map displays daytime temperatures only, so data retrieved by AIRS during the night are not included (which explains the big empty area). Finally, data quality restrictions.

What do the colors mean?

The color bar is the key to reading the temperature map. The bar will tell you the darkest purple color in the map shows where temperatures are -30 degrees F. Sky blue is approximately 20 degrees, yellow shows temperatures of around 40 degrees, and deepest red tops out at 70 degrees.

The temperature of the atmosphere changes as you go up from Earth's surface. At what altitude are these temperature maps associated with?

AIRS can retrieve temperature data from different levels in the atmosphere. The temperatures you see here are found at an atmospheric pressure level of 700 millibar. Atmospheric pressure is highest at Earth's surface and then decreases as you go up in altitude. 700 millibar pressure occurs at approximately 10,000 ft (3,000 m) altitude.

Roughly 1/3 of the atmosphere's mass is found in the layer below 700 millibar. This level of the atmosphere is located in the upper reaches of the lower troposphere, and the display of warm air masses, cold air masses, and frontal boundaries are particularly vivid at this pressure level.

Click on the image above to view a temperature map created by combining the last 3 days of data

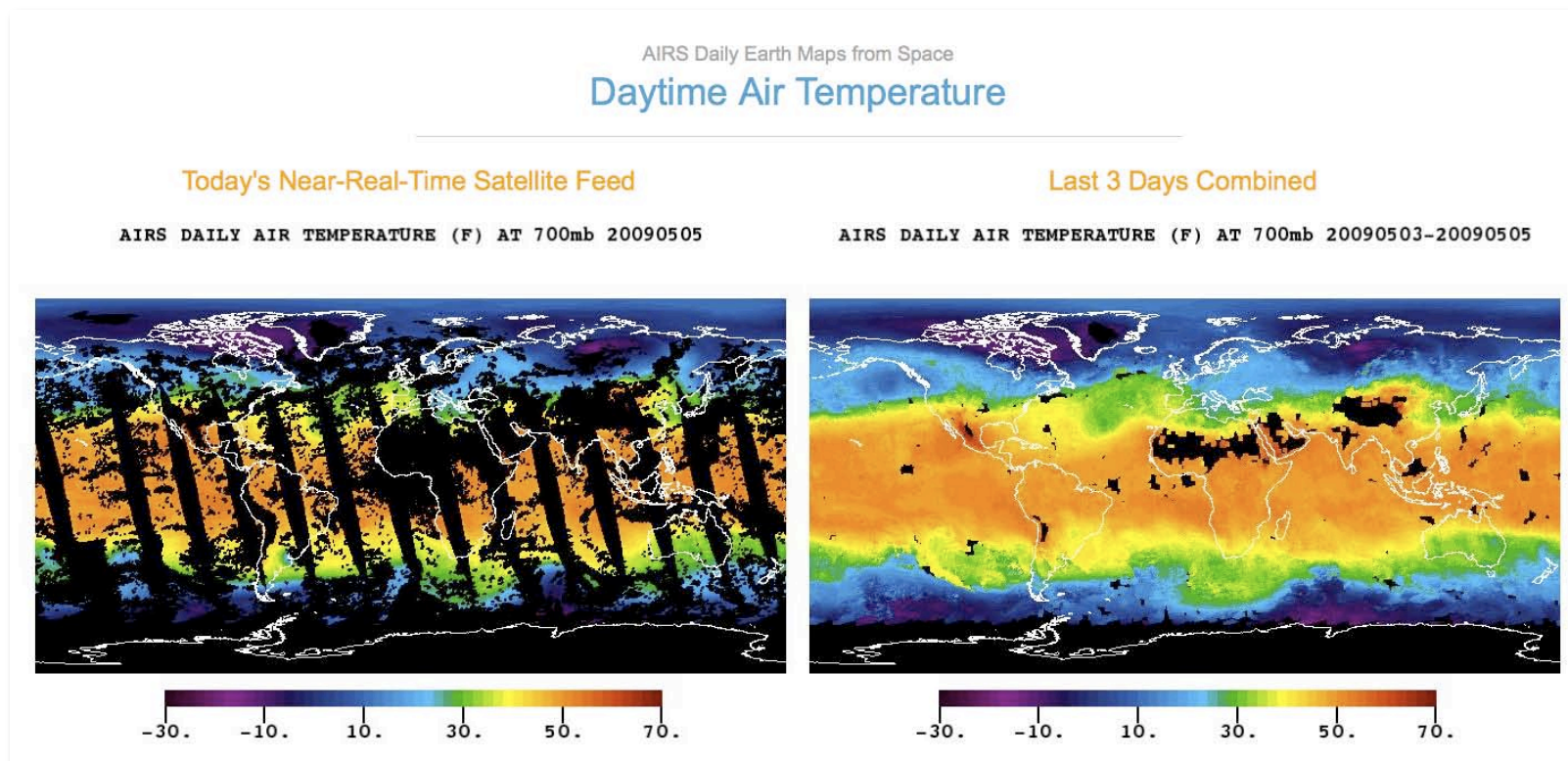
Creating a map like this allows us a more

View today's Data Granule Maps

AIRS data is sectioned into pieces and each piece is called a “granule”

View more of Earth's trace gases at
[AIRS Daily Earth Maps From Space](http://airs.jpl.nasa.gov)

Side-by-side Maps Page:





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Jet Propulsion Laboratory
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Web Site Enhancements

- Researcher Video Profiles

Climate change, trace gases, and satellites - An interview with Chris Barnet

Trace gases in Earth's atmosphere are the driver of climate change, says Chris Barnet of NOAA-NESDIS. In this interview, Chris talks about the need to measure these gases, find their sources and sinks, and how satellite data is critical in our ability to do just that.

I'm Chris Barnet. I work for NOAA-NESDIS, and we're utilizing operational sounder data including AIRS and other instruments.

I work with NOAA-NESDIS. I would say the proper way to think of this is that NASA is a development arm to develop the instrument, develop a lot of the concepts to make the measurements. At NOAA, our principle goal is to make these products operational day in, day out, distribute radiances to the weather community, distribute AIRS products such as climate products to the communities, such as the carbon communities, the ozone community, etc. Our goal is to really merge AIRS with other instrument concepts, build long-term records and distribute the data to the users.



Chris Barnet

Research Scientist
Satellite Meteorology & Climatology
Division
NOAA-NESDIS

National Oceanic and Atmospheric Administration -
National Environmental Satellite, Data, and
Information Systems

Trace Gases Drive Climate Change

Since the trace gases are really the driver for global climate change the idea is to use these instruments to simultaneously measure temperature, clouds, moisture, as well as the greenhouse drivers such as CO₂ and methane. So AIRS is ideal for this because AIRS measures all these products simultaneously. The real issue is to try to find where the sources and the sinks of these gases [are], how much of it is anthropogenic versus natural.

While satellite data makes it more difficult to see the lower atmosphere, the large volume of data, the fact that we get 324,000 measurements a day, every single day, every part of the Earth, day and night, that is the key element of satellite data that no other measuring system can provide. This is part of a bigger system when we're trying to understand these very complicated processes on Earth. AIRS plays a pivotal role in giving a global context. It gives us the ability to verify that we understand how things move in the atmosphere. How the CO₂ and the methane move from equator to pole, etc. It allows us to test our models. It allows us to verify other data by combining AIRS with other data, etc. So the satellite role is pivotal in trying to get a good global perspective of how the Earth system is responding to fossil fuel emissions, to a warming environment, etc.

CO₂ Is The Main Driver of Climate Change

CO₂ and methane are both gases that absorb the thermal energy that's reflected from the Earth. So if you increase CO₂ you get an increase in the warming of the Earth. It's a relatively direct effect. Right now the current thinking is, with global climate change, we've added 50% of the CO₂ in the last 100 years. That's the highest CO₂ that's been recorded for hundreds of thousands of years. That directly relates to how much heating the Earth is going to

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Atmospheric Infrared Sounder (AIRS)

AIRS Researcher Video Profiles

How are researchers using AIRS data, and what questions are they trying to answer? This gallery of interviews may give a glimpse into the scope of work being done in weather and climate research using AIRS data. It may also answer some questions you have about what goes into researching Earth's atmosphere.



Climate change, trace gases and satellites

An interview with Chris Barnet of NOAA-NESDIS



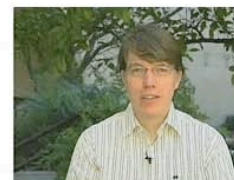
Chasing atmospheric molecules to build an indisputable climate record

An interview with Larrabee Strow of UMBC



Recipe for a better climate model

An interview with Andrew Gettelman of NCAR



Teasing out carbon dioxide from Earth's atmosphere

An interview with Cyril Crevoisier of CNES, France

Good morning Mr. Buis,
We are a Brazilian teen team that will represent Brazil in a robotic championship in Copenhagen, Denmark known as FIRST LEGO League next May 1, 2009. The subject of this championship is climate connections- global warming. As part of the championship rules, besides robot's construction and conclude specific tasks, the teams have to presentate an inovative solution to the climate problem. In our research we mentioned the studies published by the JPL Senior Reseach Scientist Hartmut Almann, about the correlation between the frequency of the extremely high clouds in the Earth'tropics and seasonal variations in the average sea surface temperature of the tropical oceans.
We would like to congratulate your team for good job and thank you for publishing this study, that helped us so much in our research and we are wishing our research gives us a good result in the championship.

Best regards,
Terradroide Team
São Paulo, Brazil

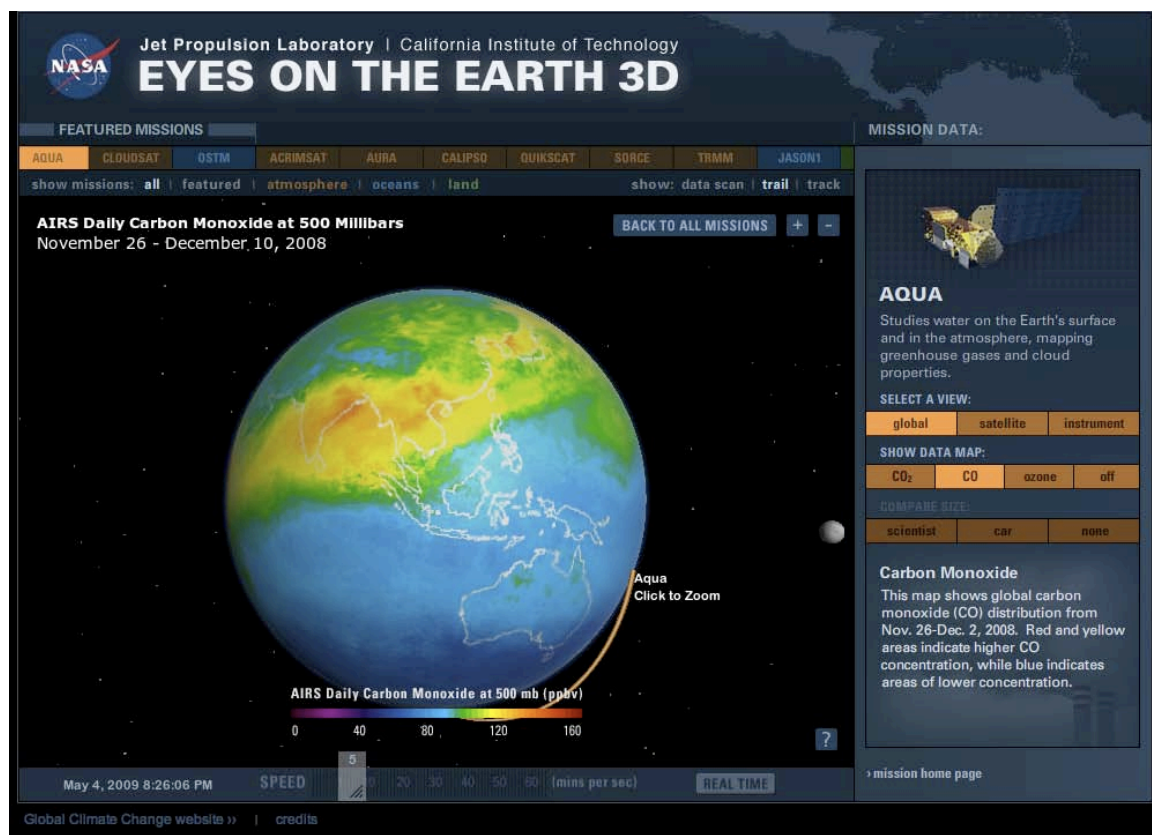


Notable Image/ Data Uses, continued:

- Eyes on the Earth 3D feature AIRS Near-Real-Time Imagery

This new interactive featured on NASA's Global Climate Change Web site gives the public the opportunity to "fly along" with NASA's fleet of Earth science missions and observe Earth from a global perspective in an immersive, 3-D environment.

The interactive uses 6 AIRS near-real-time data product maps, available as both a latest satellite feed map and a 3-day average map, originally created for the AIRS web site.



climate.jpl.nasa.gov

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